R E M A R K S

The Office Action of August 21, 2009 has been carefully considered and reconsideration of the application in view of the present submission is respectfully requested.

New claims 34 to 39 are presented. Hence, claims 1, 3, 5-9 and 21-39 are now pending.

Explanation of the Claim Amendments

As the foregoing claim amendments add no "new matter" to the application and also place the application in better condition for allowance/appeal. Applicants request that such amendments be entered into the record for further examination. The basis for new claims 34 and 35 is found in the specification on page 7. The basis for new claims 36 to 39 is found in the specification on page 9.

Claim Rejections

In the aforementioned Office Action, the claims were rejected on various grounds which are individually discussed below.

35 USC § 103 (a) Rejections

Obviousness Rejection Claims 1, 5-7, 21-24 and 27-30

Claims 1, 5-7, 21-24 and 27-30 stand rejected as allegedly being unpatentable over the disclosure of Katsuragi et al (US2002/0069789) in view of Zhu (US5889083).

Katsuragi et al (US2002/0069789 as the closest prior art, as suggested by the Examiner, at most, this reference can only be considered as teaching within its broad disclosure a liquid composition which contains a polyvalent metal salt and an acid including amino groups which is used with a colored ink. Calcium and magnesium polyvalent metal salts are preferred{paragraph [0043] and [0050]}; only calcium and magnesium are exemplified in Liquid Compositions 1, 2 and 3. The second reference is Zhu (US5889083), teaches a formulation of an aqueous ink with a colorant, a binder resin and a wax. Additional salts may be added to achieve a desired conductivity. The colorant in Zhu is polymerically dispersed and is preferably carbon black.

The Examiner has not made a prima facie case that the claimed compositions would have been obvious based on the teachings of Katsuragi and Zhu. The examiner has not stated the proper motivation for a person of ordinary skill in the art to use a copper fixer fluid in combination with a self-dispersing pigment with a soluble polymer binder or/and calcium cation, when Katsuragi recommends that calcium and magnesium are preferred in the fixer fluid. Furthermore, the examiner has not provided proper motivation to formulate the fixer fluid without the acid with amino groups as required in the Katsuragi. In addition, the examiner has not demonstrated why the self-dispersing pigment of Katsuragi would be equated to the dispersed colorant of Zhu to achieve the combination of a self-dispersing pigment and a soluble polymer binder or/and calcium cation. Self-dispersing pigments are ionically stabilized and sensitive to the amount of ionic content in the ink. The colorant is Zhu is a dispersed pigment, especially a dispersed pigment. As such it has been stabilized by a dispersant that has both ionic and steric stabilization. Discussions of the sensitivity of self-dispersing pigments to ionic content in the ink can be seen in Suzuki et al (US6153001) where the “the content of calcium, iron, and silicon in the ink is 10 ppm or less and preferably 5 ppm or less (column 8, lines 60 to 64). Likewise in Yeh et al (US6852156) discloses “another preferred self-dispersing pigment concentrate comprises water and pigment wherein the pigment has a conductivity of less than 0.15 S/m (Siemens/meter) and counter ions of less than 0.15 moles per liter” (Column 9, line 20 to 23).

What was discovered by Applicants, contrary to expectation, is that the multivalent metals are not equivalent as fixers for an ink comprising SDP when that ink further comprises a soluble polymer binder or/and an effective amount of calcium cation. Fixers with copper nitrate, copper sulfate, or copper acetate gave surprising, unpredictable, and unexpectedly superior OD results compared to fixers with calcium and other metals when used with a first ink comprising SDP and a soluble polymer binder or/and an effective amount of calcium cation. These unexpected results, which are demonstrated in Applicants' specification, are stressed in that the superior performance of the copper fixer in combination with an SDP ink containing soluble polymer binder and/or calcium cation is of significant magnitude, and practical importance as it results in a visually perceptible increase in OD and consequently better image quality.

In Example 3 of the specification (See Table after paragraph [0127]), Ink B (self-dispersing pigment with soluble polymer binder) paired with the copper-nitrate

containing fixer D1 achieved significantly and surprisingly superior optical density at a lower area fill of the fixing fluid than the same ink paired with other fixers including calcium-containing fixer F1. The ability to use lower area fill of fixing fluid is advantageous because it imposes less liquid load on the substrate. At fixer fills greater than 75%, paper curl was severe.

In Example 6 of the specification (See Table after paragraph [0134]), inks L2-L4 (self-dispersing pigment with multivalent metal salt) paired with the copper nitrate fixer D1 gave better optical density than similar ink (Ink L 1, no salt) paired with D1. Especially advantageous is the pairing of Ink L2 (with added calcium salt) and copper nitrate fixer D1 which gave surprisingly superior optical density than the same ink fixed with calcium nitrate fixer A1. Similarly, an ink comprising self-dispersing pigment and both soluble binder and calcium salt (Ink M) paired with copper nitrate fixer D1 gave surprisingly superior optical density when compared to the same ink fixed with calcium nitrate fixer A1.

Since all of the claims require that a copper nitrate, copper sulfate, or copper acetate containing fixer fluid be used with the first ink comprising an SDP and a soluble polymer binder or/and calcium cation, they are clearly commensurate in scope with the unexpected results shown in the specification.

Based on these arguments above Obviousness Rejection 1 should be overcome for claims 1, 5-7, 21-24 and 27-30.

Obviousness Rejection Claims 1, 5-7, 21-24 and 27-30

Claims 1, 5-7, 21-24 and 27-30 stand rejected as allegedly being obvious over the disclosure of Zhu (US5889083) and Katsuragi et al (US2002/0069789).

For Claims 21 and 27 as argued for Obviousness Rejection 1, Zhu and Katsuragi do not provide the motivation to combine the self-dispersing pigment with a soluble polymer binder or/and a calcium cation ink and an additional copper (II) fixer described in this application. Zhu teaches a colorant which is preferably a polymerically dispersed carbon black. This polymerically dispersed carbon black is not sensitive to the addition of ionic materials, especially when the addition of ionizable materials to obtain the desired conductivity and are indicated to be up to 2 % or 20,000 ppm. The examiner states that the inks of Zhu comprise an effective amount of calcium based on Zhu at column 9 line 60 – column 10 line 10. This addition of the effective amount of calcium in Zhu is to achieve a desired conductivity, not a minimal amount of calcium to act with the

self-dispersing pigment and the copper fixer fluid to obtain a print with very high OD. Newly added claims 35 and 36 limit the amount of calcium in the self-dispersing pigment ink to less than 200 ppm.

For Claim 1, in which only a soluble polymer is present, Zhu exemplifies the addition of significant amounts of acidic functionalized binder and an additional wax (see Examples 1, 2 and 3 where the acid number is 213 (or 3.8 as milliequivalents per gram of binder). The amount of Joncryl 67 in the Examples leads to a salt molarity of at least 0.3 molar ionic function. Claims 36-39 have been added to show the limitation of ionic (acidic) function on the polymers added to the ink. As described above it is expected that the ink containing self-dispersing pigment shown in the application would be unstable with this high level of ionic compound from the polymeric binder as shown in Zhu.

The examiner has not shown how a person skilled in the art would be motivated to modify the ink composition of Zhu by changing the polymeric binder such that its ionic content was much lower than what was exemplified; remove the wax and substitute a self-dispersing pigment for a polymerically stabilized pigment. These are too many steps to be performed.

The Examiner has not provided the proper motivation or suggestion to combine references from the combination of Zhu and Katsuragi that will lead to the unexpected OD results of the inventive ink.

Based on these arguments above, Obviousness Rejection 2 should be overcome for Claims 1, 5-7, 21-24 and 27-30.

Obviousness Rejection Claims 3 and 31

Claims 3, and 31 stand rejected as allegedly being obvious over the disclosure of Zhu (US5889083) and Katsuragi et al (US2002/0069789) further in view of Yue et al. (US 61461418).

The combination of these references does not motivate or suggest the combination described in the invention and especially the unexpected results of improved OD describe above.

The examiner does not describe how the combination of Zhu and Yue inks with polymeric binders is used with a second fixer ink containing copper (II) salts derived from copper nitrate, copper sulfate and copper acetate.

Based on these arguments the Obviousness Rejection 3 should be overcome for claims 3 and 31.

Obviousness Rejection Claims 8 9, 25, 26, 32 and 33

Claims 8 9, 25, 26, 32 and 33 are rejected as being obvious over Katsuragi et al (US2002/0069789) and Zhu (US5889083) further in view of Suzuki et al. (US 6153001).

For claims 25, 26, 32 and 33 which include an effective amount of calcium in the ink with the self-dispersing pigment; Suzuki explicitly teaches that little if any calcium can be present in the ink at column 8 lines 60 to 64.

> "It is desirable to refine the prepared hydrophilic pigment by removing impurities such as oxidizing agents unremoved and other inorganic and organic impurities. Preferably each content of calcium, iron and silicon in the ink is 10 ppm or less and preferably 5 ppm or less."

Thus, one of ordinary skill in the art could not take the teaching of Suzuki to arrive at the ink composition with the self-dispersing pigment and effective amount of calcium since Suzuki explicitly limits the content of calcium.

For claims 8 and 9, the Examiner does not describe how the combination of Katsuragi and Suzuki inks with self-dispersing pigments are used with a second fixer ink containing copper (II) salts derived from copper nitrate, copper sulfate and copper acetate to obtain the unexpectedly improved results of the combination of an ink with a self-dispersing pigment and a soluble polymer binder is used with a second fixer ink containing copper (II) salts derived from copper nitrate, copper sulfate and copper acetate.

Concluding Remarks

As previously stated, the technical problem addressed in the application is to provide both high optical density (OD) and good rub-fastness in an ink set comprising at least one aqueous ink containing a self-dispersed pigment (SDP) colorant, a soluble polymer binder or/and an effective amount of calcium cation and an aqueous fixer fluid comprising a soluble copper nitrate, copper sulfate, or copper acetate salt. As stated in the specification at paragraphs [0010], one of ordinary skill in the art at the time of the invention would have generally expected the addition of polymer binder to improve rub-fastness but decrease OD, presumably because the polymer binder helps shield the pigment from the OD enhancing effect of the fixer. Applicant's, however, have found that from among the infinite number of possible combinations, only a certain cationic {copper(II)} (nitrate, sulfate or acetate)salt fixer/SDP ink combination with soluble polymer binder or/and a calcium cation present does not experience this negative effect

on OD.

It is well established that evidence of unobvious or unexpected advantageous properties, can rebut prima facie obviousness and Examiner must consider such evidence. [MPEP § 716.01 (a) and § 716.02(a)].

Since all of the claims require that the use of a copper nitrate, copper sulfate, or copper acetate salt fixer fluid and the first SDP ink to comprise soluble polymer binder or/and multivalent, namely calcium cation, each is commensurate in scope with the unexpected results shown in the specification.

In conclusion, although the Applicants maintain that the cited references do not set forth even a prima facie case for obviousness and it is respectfully submitted that the evidence here shown of unexpected superior results is compelling and sufficient to rebut any prima facie case of alleged obviousness. In the face of the amended claims and the unexpected results shown in the application, Applicant requests that all rejections made under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the above remarks and newly presented experiments, all rejections are believed to have been successfully traversed and the pending case is otherwise believed to be in condition for allowance. If the Examiner should believe that anything further may be required to place this application in even better form for allowance, Examiner is cordially invited to telephone the undersigned attorney for Applicant.

Respectfully submitted,

/Angela J Grayson/

Angela J Grayson
AGENT FOR APPLICANTS
Registration No.: 54,136
Telephone: 302 892 7178
Facsimile: (302) 355-3982

Dated: January 21, 2009